Sorting Bubble Sort, Selection Sort.

Week-03, Lecture-02

Course Code: CSE221
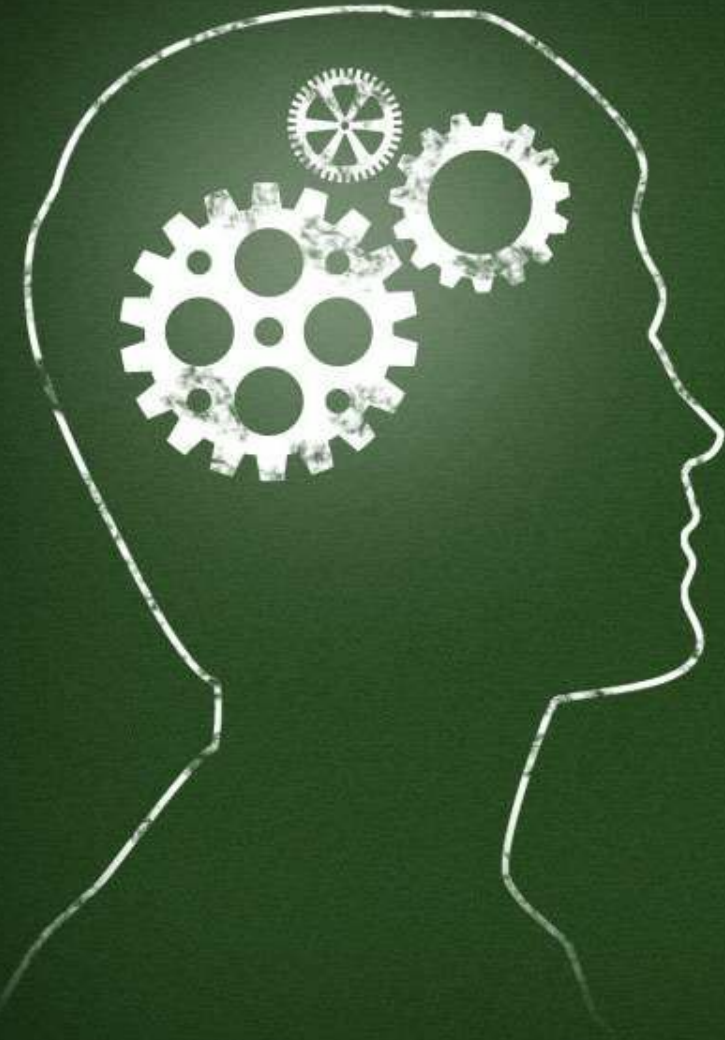
Course Title: Algorithms

Program: B.Sc. in CSE

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Bubble sort

This is a simple sorting algorithm.
The Input to this algorithm will be like this

Enter how many numbers you want to sort in
Increasing order: 6
Enter the numbers to be sorted:
1,3,5,2,4,6

The output of this algorithm will be like this:

The result after sorting your numbers in increasing order is:

1,2,3,4,5,6

The array of data to be sorted is

1,3,5,2,4,6 (in increasing order)

The process of "Bubble sorting"

1 < 3 no swapping

1 3 5 2 4 6

The array of data to be sorted is
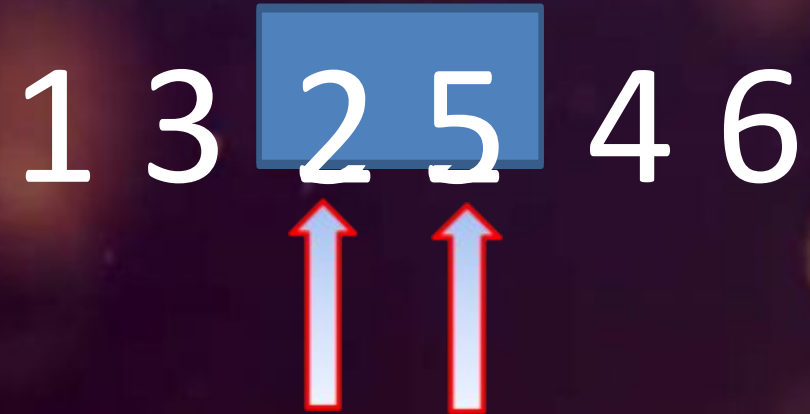
1,3,5,2,4,6

The process of "Bubble sorting"

3<5 no swapping

1 3 5 2 4 6

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

5 > 2   swapping

1 3 2 5 4 6

The array of data to be sorted is

  1,3,5,2,4,6

The process of "Bubble sorting"

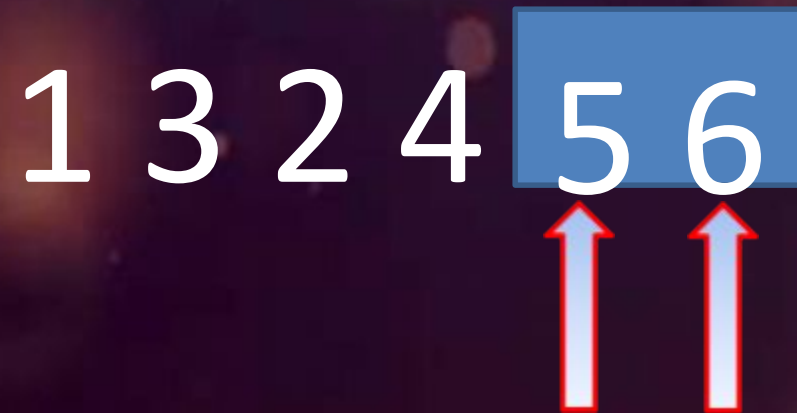   5 > 4   swapping

1 3 2 4 5 6

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

5 < 6   no swapping

1 3 2 4 5 6

The array of data to be sorted is

1,3,5,2,4,6

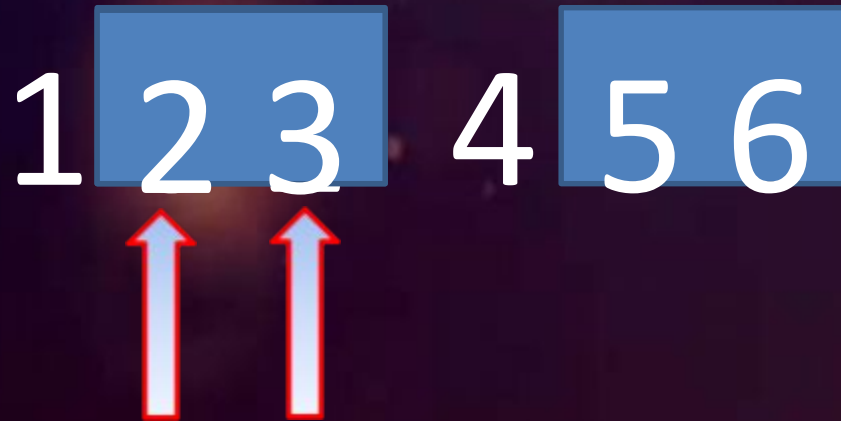The process of "Bubble sorting"

2nd pass   1 < 3   no swapping

1 3 2 4 5 6

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

2nd pass   3 > 2 swapping

1 2 3 4 5 6

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

2nd pass   3 < 4 no swapping
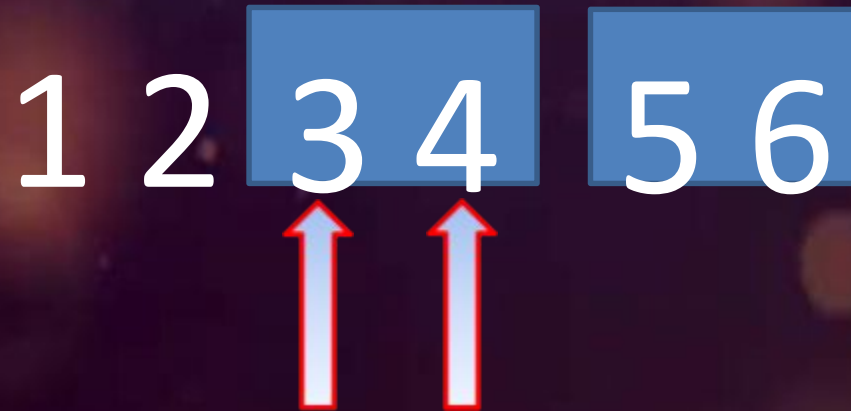
1 2 3 4 5 6

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

3rd pass   1 < 2   no swapping
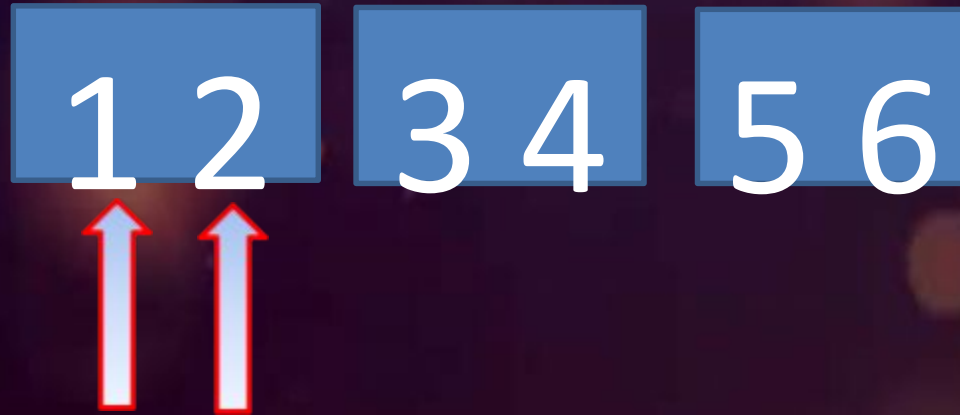
| 1 | 2 | 3 | 4 | 5 | 6 |

The array of data to be sorted is

1,3,5,2,4,6

The process of "Bubble sorting"

The result after "Bubble sorting" is

1 2 3 4 5 6

ALGORITHM:

```
Bubble sort ( array, n)
{
    for ( i = 1 to n-1 )
  {
    flag = 0 ;
      for ( j =  i + 1 ; j <= n ; j++ )
      {    if ( array (  i ) > array ( j ) )
        {          Swap( array ( i ) , array ( j ) ) ;
          flag = 1 ;
        }
  }
    }
}
```

n is the number of elements to be sorted

if   i = 1 then j = i + 1 = 2

if first num > second num

the value which is in i will be assigned to j
the value which is in j will be assigned to i

SELECTION SORT

Description

A sorting technique that is typically used for sequencing small lists.

- The Selection Sort searches (linear search) all of the elements in a list until it finds the smallest element. It "swaps" this with the first element in the list. Next it finds the smallest of the remaining elements, and "swaps" it with the second element.

The Selection Sort Algorithm

● For each index position **i**

  – Find the smallest data value in the array

  from positions **i** *through* **length – 1,** *where*

  length is the number of data values

  stored.

  – Exchange (swap) the smallest value with

  the value at position **i.**

A Selection Sort Example

Smallest?

We start by searching for the smallest element in the List.

6
2
1
3
5
4

Smallest?

6
2
1
3
5
4

Smallest!

| 6 |
| 2 |
| 1 |
| 3 |
| 5 |
| 4 |
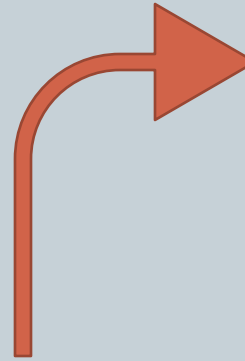
Swapped!

1
2
6
3
5
4

Smallest?

1
2
6
3
5
4

After the smallest element is in the first position, we continue searching with the second element and look for the next smallest element.

Smallest!

In this special case, the next smallest element is in the second position already. Swapping keeps it in this position.

1
2
6
3
5
4

Swapped

Swapping keeps it in this position.

1
2
6
3
5
4

Smallest?

After the next smallest element is in the second position, we continue searching with the third element and look for the next smallest element.

1
2
6
3
5
4

Smallest!

1
2
6
3
5
4

Swapped

1
2
3
6
5
4

Smallest?

1
2
3
6
5
4

Smallest?

1
2
3
6
5
4

1
2
3
6
5
4

Smallest!

1
2
3
4
5
6

Swapped

The last two elements are in order, so no swap is necessary

| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |

What "Swapping" means

TEMP

6

6
2
1
3
5
4
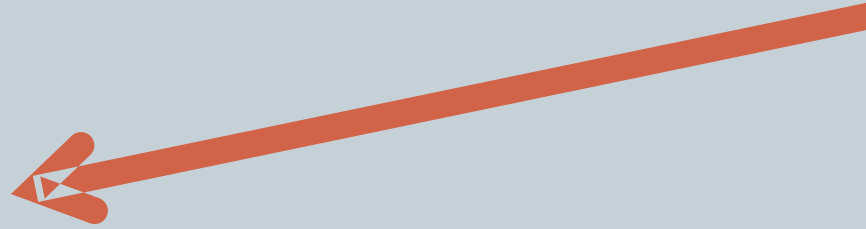
Place the first element into the Temporary Variable.

TEMP

6

Replace the first element with the value of the smallest element.

1

2

1

3

5

4
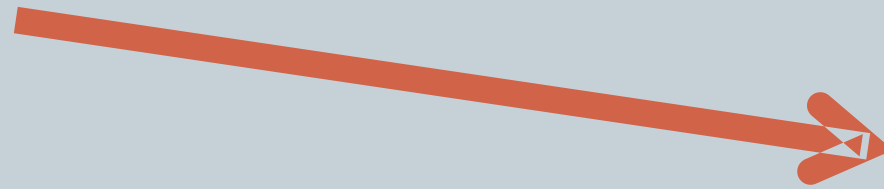
Textbooks & Web References

- Reference book iii (Chapter 10)

- www.visualgo.net

Thank you
&
Any question?